

MISSOURI RIVER BETWEEN ITS MOUTH AND SIOUX
CITY, IOWA.

L E T T E R

FROM

THE ACTING SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE CHIEF OF ENGINEERS, REPORT OF
EXAMINATION OF MISSOURI RIVER BETWEEN ITS MOUTH AND
SIOUX CITY, IOWA, INCLUDING SECTIONS AT AND NEAR HER-
MANN, WEST GLASGOW, WILHOITE BEND, LEXINGTON, AND
ST. JOSEPH, MO.

JANUARY 19, 1904.—Referred to the Committee on Rivers and Harbors and ordered
to be printed.

WAR DEPARTMENT,
Washington, January 18, 1904.

SIR: I have the honor to transmit herewith a letter from the Chief
of Engineers, United States Army, dated January 15, instant,
together with a report from Capt. H. M. Chittenden, Corps of Engi-
neers, dated October 26, 1903, on an examination of Missouri River
from Sioux City, Iowa, to the mouth of said river; also at and near
Hermann, West Glasgow, Wilhoite bend, Lexington, and St. Joseph,
made by him in compliance with the provisions of section 1 of the
river and harbor act of June 13, 1902.

Very respectfully,

ROBERT SHAW OLIVER,
Acting Secretary of War.

The SPEAKER OF THE HOUSE OF REPRESENTATIVES.

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, January 15, 1904.

SIR: I have the honor to submit herewith, for transmission to Con-
gress, report dated October 26, 1903, by Capt. H. M. Chittenden,
Corps of Engineers, on examination authorized by section 1 of the

river and harbor act approved June 13, 1902, of Missouri River from Sioux City, Iowa, to the mouth of the river, with a view to ascertaining whether navigation can be obtained at a reasonable cost by dredging and the removal of obstacles; also at and near Hermann, West Glasgow, Wilhoite bend, Lexington, and St. Joseph, with a view to ascertaining what improvements in these localities, if any, are necessary for navigation.

Captain Chittenden's report has been referred for consideration by the Board of Engineers for Rivers and Harbors, as provided by section, 3 of the act of June 13, 1902, and attention is respectfully invited to its report of January 4, 1904, in seventh indorsement thereon. The Board has very carefully reviewed all the features involved in the treatment in the interests of navigation of the Missouri River from Sioux City to the mouth, including the various localities named in the act, and concludes its report as follows:

To sum up, in the matter of the Missouri River between Sioux City, Iowa, and its mouth, the Board recommends:

(1) That it is advisable to provide for snagging operations by means of a permanent appropriation of \$35,000 annually, but the amount available for each of the next two years should be \$50,000.

(2) That navigation can not be secured at reasonable cost by means of dredging.

(3) That no improvements are necessary for navigation, or advisable, at and near West Glasgow, Wilhoite bend, Lexington, or St. Joseph.

(4) That it is advisable in the interests of navigation to undertake improvements at and near Hermann, at a cost of \$10,000.

I concur in the views and recommendations of the Board.

Very respectfully, your obedient servant,

G. L. GILLESPIE,

Brig. Gen., Chief of Engineers, U. S. Army.

Hon. ELIHU ROOT,

Secretary of War.

EXAMINATION OF MISSOURI RIVER BETWEEN ITS MOUTH AND SIOUX CITY, IOWA, INCLUDING THE SECTIONS AT AND NEAR HERMANN, WEST GLASGOW, WILHOITE BEND, LEXINGTON, AND ST. JOSEPH, MO.

UNITED STATES ENGINEER OFFICE,

Sioux City, Iowa, October 26, 1903.

GENERAL: I have the honor to submit herewith a report upon examinations required by act of Congress of June 13, 1902, at the following points:

(1) Missouri River between mouth and Sioux City, "with a view to ascertaining whether navigation can be obtained at a reasonable cost by dredging and the removal of obstacles;" (2) Hermann; (3) West Glasgow; (4) Wilhoite bend; (5) Lexington; (6) St. Joseph.

In regard to the practical value of snagging operations on the Missouri River there is no doubt. Snags are the most formidable danger to the navigation of that stream. The recent flood has brought into the channel a great many new snags, and their complete removal will be a matter of several seasons' work.

In the matter of dredging operations it has not been practicable, on account of cost, to equip a dredge boat for experiment in maintaining a channel over shallow bars; and the high water of the past two sea-

sons has made operations of that kind unnecessary. The entire distance from Kansas City to the mouth of the river was traversed by the Government snag boat *McPherson* in October of both 1902 and 1903, without being stopped once by shallow water. There is, however, no question of the feasibility of sluicing or dredging channels across the bars in low water, and it is believed that a combined dredge and snag boat could be devised which would be very effective in maintaining a navigable depth in the low-water season.

An estimate of \$50,000 was submitted in my last annual report for snagging. At that time the effect of the great flood of last May and June was not known, and a recent low-water inspection of the river has disclosed so many new snags that it is important to increase this estimate until the river is restored to its normal condition. I would therefore recommend that the estimate of \$50,000 for the next two years be doubled.

HERMANN, MO.

Hermann is the center of a considerable river trade, which embraces the Gasconade and Osage rivers and the Missouri for a distance up and down of about 50 miles. The conformation of the bluff shore on the south bank is such that the river tends to leave it in the vicinity of Hermann, and that port has often suffered from silting up in recent years. The river divides opposite the town, a considerable portion going behind an island. It would remedy the condition at Hermann if the chute behind the island could be closed by a dike, so that the entire stream should flow along the right bank.

In connection with this work, however, it would be important to close the chute between Bates Island below town and the south shore, forcing the whole river through the main channel on the north side of the island, thus making the course of the river on leaving Hermann conform naturally with that approaching town. This would necessitate a strong dike to close the chute and the revetment at the head of Bates Island.

The dikes would have to be very heavy—four-row—and the total length would not be less than 2,000 feet. Their cost at \$10 per foot would be \$20,000. The revetment at the head of the island would be about 4,000 feet long and would cost \$40,000. The total cost of the improvement is estimated at \$60,000. It all applies strictly to the interests of navigation on a portion of the river where commercial boating is of considerable importance.

GLASGOW, MO.

The course of the river just below Glasgow, Mo., is around a very sharp bend from a direction nearly east to one slightly west of south. The bend is already sharper than it should be for practical navigation. The tendency of the river has been for years to erode the right bank upstream from this curve for a distance of upward of 4 miles. The Chicago and Alton Railroad has stopped this erosion for a distance of over 2 miles where their line lies close to the river along the upper portion of the stretch described. It is important for the maintenance of the navigable channel that the remainder of this distance be also held from further cutting, both for the purpose of preventing a sharper curvature around the bend and of maintaining sufficient distance

between the bend and the railroad bridge to permit boats to make the approach to the bridge, about a half a mile below, with ease and safety.

The length of bank requiring revetment is about 10,000 feet, which, at the standard estimate of \$10 per foot, covering all expenses, would be \$100,000.

WILHOITE BEND.

The channel of the river in Wilhoite bend is in very bad shape. The heavy dike put in between bank heads 5C and 6C had the effect, during the recent flood, of turning the current strongly inshore into a low swale extending across the country to the Chariton River. It cut away the right bank, which formerly acted as a levee against high water and has now left the bank so low that ordinary high water threatens to open a new channel along this line of low ground. Already cutting has begun in several places.

The bank head just below this dike now amounts practically to an obstruction in the river. It juts out as a sharp point, forcing the river entirely out of its regular course, and develops a current around the point which amounts almost to a torrent. The whole situation could scarcely be worse than it is from the point of view of navigation, while the works themselves have created dangers to the neighboring lands which did not exist before.

A levee should be built from the dike above mentioned to the bank head 6C, to restore, as far as possible, the original condition as regards overflow. The bank head, now partially destroyed, should be allowed to go, and the point be eroded back until a fair shore line is developed, when it should be secured by standard revetment, which should be extended to a safe distance above and below.

The levee work would be but a small item, estimated not to exceed \$2,000.

The bank revetment should cover a distance of not less than 7,200 feet, which, at the standard estimate of \$10 per foot, covering all expenses, would be \$72,000. Some expenditures will be required to remove obstructions caused by existing works, and the total sum of \$75,000 is estimated for the entire improvement at this point. This would rectify and secure the bank from the upper bank head 4C to a point about 1,000 feet below the lower bank head 6C.

LEXINGTON, MO.

A recent examination of the river in the vicinity of Lexington, Mo., does not indicate the necessity of any immediate extensive work at that point in the interest of navigation exclusively.

ST. JOSEPH, MO.

The Government has done nearly \$1,000,000 worth of work in the vicinity of St. Joseph. It consists nearly all of standard revetment, with the addition of one longitudinal dike and one heavy dike at the lower end of the work, built at an oblique angle with the channel. The revetment commences on the left bank of the river several miles above St. Joseph, in the vicinity of the city waterworks, and continues for a distance of nearly 20,000 feet. Commencing about a mile below

this revetment and on the right bank of the river is another revetment in Belmont and Elwood bends, of about the same length as the first. This makes about $7\frac{1}{2}$ miles of revetment work, all of which is above town. Below town there is about a mile and a half of similar work on the left bank of the river. Immediately above this latter work the harbor line of the city commences and the city can be depended upon to care for the river within its limits.

There should, however, be some work done to connect the lower end of the Elwood bend revetment and the upper end of the city harbor line. It should consist of a longitudinal dike to cut off the chute on the right bank of the river, and standard revetment along the left bank, extending from the harbor line about 7,500 feet upstream. The length of the longitudinal dike on the right bank will be about 2,500 feet, making a total of about 10,000 feet of improvement work. Both dike and standard revetment are estimated to cost \$10 per running foot, which would make a total expenditure of \$100,000 for this improvement. This would connect the existing revetment above town with the upper end of the harbor line, which at the lower end connects with the Government work below town, making a continuous improvement of about 15 miles.

In addition to this new work it is of the utmost importance that the existing revetment receive sufficient repairs to maintain it in good condition. Some of the work is very old, having been built before the Missouri River Commission took charge of the work. There have been several breaks in the revetment, which have been repaired from time to time, but the funds available for repairs have never been sufficient to make as thorough repairs as are necessary. It is estimated that at least \$100,000 should be expended on the Government works in this vicinity to put them in a state of thorough efficiency and repair. This makes a total estimate for maintenance and repairs and for new work in the vicinity of St. Joseph, \$200,000.

Very respectfully, your obedient servant,

H. M. CHITTENDEN,
Captain, Corps of Engineers.

Brig. Gen. G. L. GILLESPIE,
Chief of Engineers, U. S. A.
(Through the Division Engineer.)

[First indorsement.]

OFFICE DIVISION ENGINEER NORTHWEST DIVISION,
Chicago, Ill., October 28, 1903.

Respectfully forwarded to the Chief of Engineers.

Provision for these examinations is found in the item of the river and harbor act of June 13, 1902, appropriating money for the improvement of the Missouri River. They do not come under the general instructions for preliminary examinations contained in section 14 of that act, but, in the case of the Calumet River examination, for which provision was made in a similar manner, the Chief of Engineers directed the officer in charge to submit a plan and estimate, giving also his opinion whether or not improvement to the extent outlined is a work worthy to be undertaken by the United States. This report does not contain such opinions, except as to snagging, nor does it contain facts and figures upon which such opinions can be based.

Dredging in the Missouri River for general navigation purposes, in my judgment, should not be mentioned except in terms of condemnation.

O. H. ERNST,
*Colonel, Corps of Engineers,
Division Engineer, Northwest Division.*

[Sixth indorsement.]

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, November 16, 1903.

Respectfully referred to the Board of Engineers for Rivers and Harbors constituted by Special Orders, No. 24, Headquarters, Corps of Engineers, series of 1902, for consideration and recommendation.

By order of the Acting Chief of Engineers:

H. F. HODGES,
Major, Corps of Engineers.

[Seventh indorsement.]

BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
Washington, D. C., January 4, 1904.

Respectfully returned to the Chief of Engineers, United States Army.

The Board of Engineers for Rivers and Harbors has reviewed the within report of the district officer, submitted in accordance with the will of Congress as expressed in the river and harbor act of June 13, 1902, following the item making appropriation for the Missouri River between Sioux City, Iowa, and its mouth:

And the Secretary of War shall cause an examination to be made of said portion of said river with a view to ascertaining whether navigation can be obtained at a reasonable cost by dredging and the removal of obstacles; also at and near Hermann, West Glasgow, Wilhites [Wilhoite] Bend, Lexington and St. Joseph, with a view to ascertaining what improvements in these localities, if any, are necessary for navigation.

The indorsement of the division engineer and other data have been duly considered.

The available depth on this stretch of river varies during low-water seasons from about 2 to 3 feet. The presence of snags, of which there is a constantly renewed supply, renders navigation at times dangerous, and at low stages often obstructs and makes unavailable the deepest water.

With reference to the question "whether navigation can be obtained at a reasonable cost by dredging and the removal of obstacles," the Board believes that snagging operations afford the only practical and feasible method of assisting through navigation on the Missouri River at a reasonable cost. The amount of sand in motion and the extreme instability of dredged channels in the Missouri River forbid belief that dredging on a sufficient scale to be of material service to navigation could be carried on at a cost at all commensurate with resulting advantages to commerce. No more is to be expected from snagging than that it will materially add to the safety of navigation and make available for light-draft vessels such depths as naturally exist. Without snagging the small commerce now existing would

within a few years dwindle away and finally be abandoned. The following is a quotation from the last report of the Missouri River Commission:

A general provision for operating snag boat upon the Missouri River is recommended, similar to the provisions made for other rivers, so that the Secretary of War may be authorized to draw his warrant or requisition from time to time upon the Secretary of the Treasury for such sums as may be necessary to do such work, not to exceed in the aggregate for each year the sum of \$35,000.

The Board indorses this suggestion, and desires also to indorse the recommendation herein that for each of the next two years there be provided for snagging operations \$50,000. The larger amount is needed in the immediate future because of an accumulation of snags due to unprecedented floods.

Having in mind the fact that some of the work upon which large sums have been expended under the late Missouri River Commission in prosecution of its plan for a systematic improvement of the river is incomplete and that all of it is naturally subject to deterioration or loss, consideration has been given to the advisability of completing or maintaining any of such works. It is obvious that no benefits worth the cost would follow the maintenance of short improved reaches, disconnected with each other or with the mouth of the river. This being the case, it follows that it is inadvisable to maintain, by continuing expenditures, works that have been built for the rectification of such reaches. And the Board believes this to be true, even if, due to changes that can not all be now foreseen, the systematic improvement of the Missouri is at some unknown future time to be resumed. Of the nature of additions to or maintenance of works heretofore executed are the improvements contemplated in the act at St. Joseph and Wilhoite. The Board does not consider works at these points advisable.

The Board has also considered the advisability of improving certain localities where now or hereafter existing navigation may be jeopardized by changes in the river bed which injure or threaten to destroy important harbors or landings. Of such a character is the improvement contemplated at or near Hermann, Mo. This town is at present perhaps the most important steamboating point on the river. Several boats make this their headquarters, whence they make fairly regular trips up the Osage and Gasconade rivers, and for a distance of about 50 miles up and down the Missouri River. Unless these boats can land within a reasonable distance of the center of business in Hermann, their trade will be materially lessened and greatly inconvenienced.

Owing to the conformation of the shore line above the town, the harbor often silts up and the steamboat landing is destroyed. To overcome this the district officer recommends certain work which he estimates will cost \$60,000. In answer to a query from the Board the same officer reports that of this amount \$10,000 is required for a dike closing a chute opposite Hermann, and the balance for work below that town. Comparing the proposed expenditure with the commerce involved, the Board is of opinion that this locality is worthy of improvement by the United States to the extent of closing the chute opposite Hermann at a cost of \$10,000.

The improvements contemplated at and near West Glasgow and Lexington, Mo., appear to fall in neither class above described. No commercial benefits commensurate with the cost would, in the opinion of

the Board, result from expenditures at either locality; consequently the Board believes that it is not desirable that the United States should undertake the work.

To sum up, in the matter of the Missouri River between Sioux City, Iowa, and its mouth, the Board recommends:

(1) That it is advisable to provide for snagging operations by means of a permanent appropriation of \$35,000 annually, but the amount available for each of the next two years should be \$50,000.

(2) That navigation can not be secured at reasonable cost by means of dredging.

(3) That no improvements are necessary for navigation, or advisable, at and near West Glasgow, Wilhoite bend, Lexington, or St. Joseph.

(4) That it is advisable in the interests of navigation to undertake improvements at and near Hermann, at a cost of \$10,000.

For the Board:

CHAS. J. ALLEN,
Lieut. Col., Corps of Engineers,
Senior Member of the Board.

O